REMARKS

The Office Action dated November 9, 2007 has been received and carefully studied.

The Examiner maintains the rejection of claims 1 and 3-8 under 35 U.S.C. §103(a) as being unpatentable over Koyama et al., U.S. Publ. No. 2005/0271922 in view of Kubota et al. for reasons of record. The Examiner did not consider the evidence set forth in the submitted Declarations persuasive.

In order to address the issues raised by the Examiner regarding the experimentation previously carried out and set forth in the Declarations of record, a further Hamada Declaration is submitted herewith.

In the enclosed Declaration, the conditions described in the Examples of Kubota were exactly replicated for the sulfonation of chloromethylated polyether sulfone to sulfomethylated polyether sulfone by the thiourea method (1) and the $EtOCS_2K$ method (2) disclosed in column 7, lines 1-8 of Kubota et al., in accordance with the Examiner's suggestion. In the thiourea method (1), the oxidation step of isothiuronium salts in polyether sulfone to sulfone acid groups was only repeated for 6 hours at 50°C because formation of the isothiuronium salts (an intermediate) was confirmed by NMR with no problems, and further, for a part

of the reaction solution, the reaction was continued for 12 hours for confirmation.

The experiment of the thiourea method (1) demonstrated that it could convert only 57% and 76% of isothiuronium salts to sulfomethyl groups in the oxidation time of 6 hours and 12 hours, respectively. These results suggest that very long reaction times would be needed for the completion of the reaction, because in the first six hours the reaction proceeded to 57%, but in the second six hours, it proceeded only 19%. This means that in the second six hours, the reaction velocity was much slower, and that with a higher reaction rate, the reaction velocity would slow down further. Accordingly, very long times would be required for the completion of the reaction.

Further, ion-exchange capacity of the obtained polymer could not be determined, because the obtained polymer was decomposed with an alkaline (see the attached Declaration).

With respect to the $EtOCS_2K$ method (2), only a polymer having insufficient ion-exchange capacity of 0.36 mmol/g could be obtained for the oxidation time of 6 hours, and the obtained polymer could not be identified by NMR because it could not be dissolved in solvents used for NMR determinations.

These experiments show that the sulfonation methods of haloalkyl group specifically disclosed in Example 1 and 2 of Kubota's reference, cannot provide sulfomethyl polyether sulfone having sufficient ion-exchange ability usable as an ion-exchange polymer from the halomethyl polyether sulfone which backbone structure is represented by the present formula (IV).

Further, Kubota discloses method (4). However, the method (4) disclosure does not include the processes of the reaction and it is impossible to carry out method (4). For example, although Kubota discloses the use of sodium sulfide in method (4), as shown in Comparative Example 2 in the present specification, chloromethyl polyether sulfone did not react with sodium sulfide and could not obtain a thiol product disclosed in Kubota's method (4) or sulfomethyl polyether sulfone.

The present inventors have confirmed that the present method obtains 100% conversion of chloromethyl groups in the chloromethyl polyether sulfone into acetylthiomethyl groups at room temperature for one hour, and further obtains 100% conversion of the acetylthiomethyl groups into sulfomethyl groups at 70°C for 8 hours, by NMR determination. Further, the obtained sulfomethyl polyether sulfone has very high ion-exchange capacity of 1.29 meq/g

to the obtained polymer, as shown in the present Example 2. Although the yield of the obtained sulfomethylated polyether sulfone from the chloromethylated compounds in the present Example 2 was about 92% as shown on page 19, lines 8-9 of the present specification, the reason for the 92% yield despite the 100% conversion of the reaction is loss of the polymer in the separation processes and so on.

Considering the results of the enclosed Hamada Declaration, the previous second Hamada Declaration and Comparative Example 2 of the present invention, Kubota does not suggest that in the polyethersulfone having the present formula (IV), only the third method disclosed in Kubota (and not supported by any example) can convert the chloromethyl polyether sulfone into sulfomethyl polyether sulfone having high ion-exchange capacity such as 1.29 meq/g usable as an ion-exchange polymer.

Reconsideration and allowance are respectfully requested in view of the foregoing.

Respectfully submitted,

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